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ABSTRACT

The study grew out of a concern for a way to develop positive attitudes in children towards environmental problems. It was conducted using 29 student teachers, 15 of whom were arbitrarily assigned as the experimental group. This group participated in instructional sessions designed to assist them in implementing a special program - Elementary Environmental Attitudes Program. The instructional model for teacher training consisted of a multi-media presentation of a series of colored slides correlated with audio-tapes of music and monologue. Discussion periods followed each session. The basic research design was Campbell and Stanley's non-equivalent control design. Pretests for both experimental and control groups consisted of: Environmental Semantic Differential for both children and adults, Environmental Concern Inventory for children, and a questionnaire on Environmental Problems for the teachers. The posttests consisted of the same instruments as well as a student questionnaire. Analysis of the data was made by comparison of means of pre- and posttest scores using ANOVAR (Veldman, 1967). Certain scores on the Semantic Differential seemed to provide more selectivity and discrimination with regards to attitude change than any other instrument. The study indicates the possible potential for use of color slides as a medium for recognizing attitudinal change. (Author/EB)

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THE DEVELOPMENT AND EVALUATION OF AN ELEMENTARY ENVIRONMENTAL ATTITUDES PROGRAM

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THE DEVELOPMENT AND EVALUATION OF AN ELEMENTARY ENVIRONMENTAL ATTITUDES PROGRAM

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The current environmental crisis places environmental education as one of the top priorities in education today. Educational systems are being forced to examine their existing curricula to ascertain whether they meet the urgent needs of today's society. Do these curricula contain environmental education materials which are directed, as stated by Swan (1969), "towards developing a citizenry which is knowledgeable about its environment and its associated problems, aware of the opportunities for citizen participation in environmental problem solving and motivated to take part in such problem solving"? How best can these elements of knowledge, awareness and motivation be translated into viable school environmental education programs?

Before environmental education can be effective, and the long term goals attained, a reorientation of traditional attitudes and a clarification of value systems must be accomplished. A personal responsibility in stewardship toward our planet earth and skill in decision making toward environmental concerns is indicated.

Today's children are aware that environmental problems exist because of the bombardment of the mass media and the scare tactics of the pressure groups, but, how can they be educated so that they can adequately assess and weigh all the implications of the problems?

First of all, we must study the nature of decision making. In order to make wise decisions a student must have a clear understanding of the concepts related to the situation. Decision making, according to Kaltsounis (1971), involves three basic elements - knowledge, values and action. Values, which include all the feelings and attitudes of the decision-maker, are just as important as knowledge in making decisions; indeed, at times, value factors can be more important than knowledge. Besides this, decision-making involves action.

Secondly, what is the nature of attitude change? How can attitude change be most effectively effected? Contemporary social psychologists such as Rokeach (1971) generally agree that before changes in attitudes or in in value-related behavior can occur, there must exist what John Dewey had called a "felt difficulty" - what we commonly call a state of psychological imbalance or dissonance. Several methods can be used to create this dissonance. You can force a person to act in a way imcompatible with his professed or real attitudes and values. You can expose him to conflicting attitudes or values held by persons who are in some way important to him. Or you can expose him to information designed to make him consciously aware of inconsistencies within his own value-attitude system.

In this study it was possible to investigate the assumption that

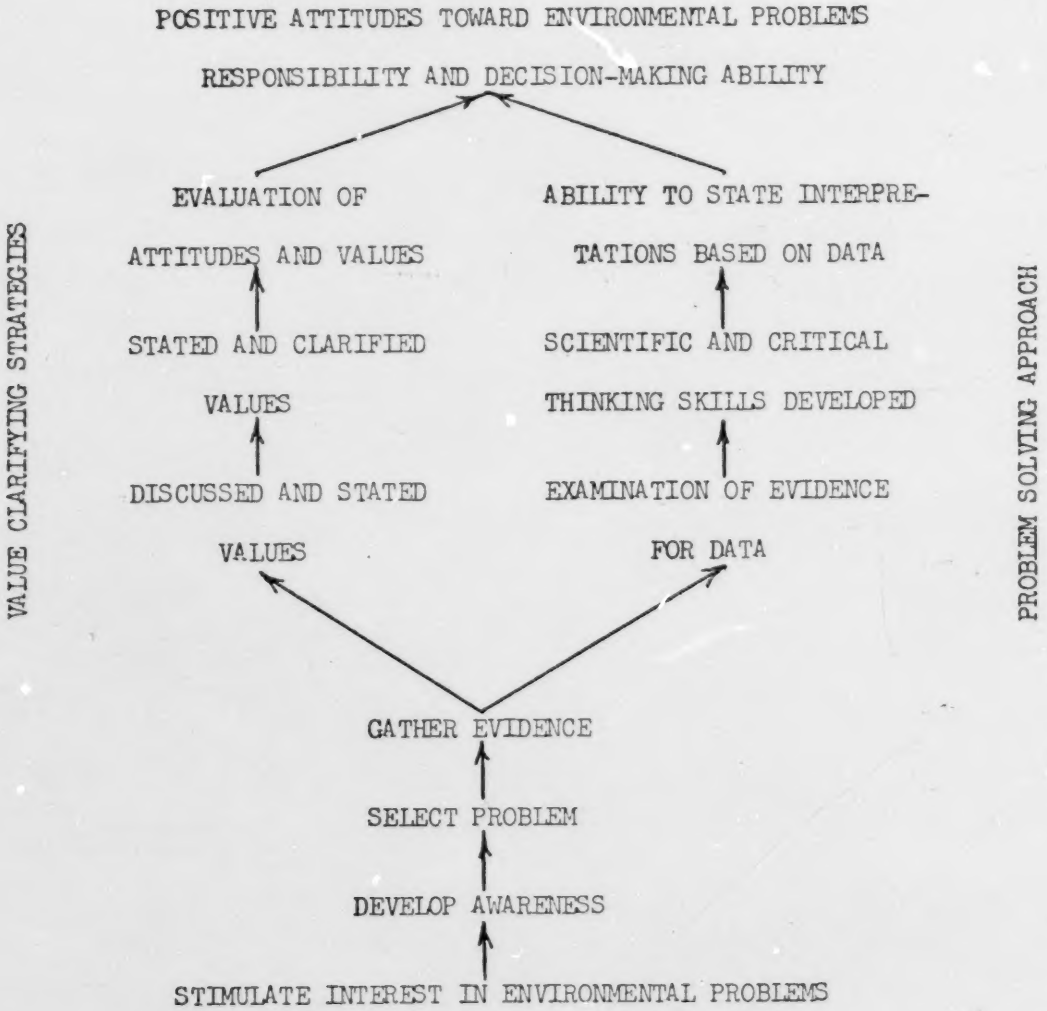
children's involvement in the acts of defining environmental problems, gathering evidence, examining data, discussing and stating attitudes and values, employing scientific and critical thinking skills, and evaluating results, will result in sufficient cognitive and affective dissonance to the extent that the children's attitude and value clarification will take place. A flow chart outlining the instructional strategies and conceptual framework on which this study is based is included as Figure 1. The value clarifying strategies are based on those developed by Raths, Harmin and Simon (1966).

Purpose of the Study

This research study has grown out of a concern for a way to develop positive attitudes in the elementary school child towards environmental problems. By positive we mean constructive and practical attitudes. Children's attitudes begin developing early along with awareness and curiosity about their surroundings. It would seem logical to encourage the development of these positive attitudes during these formative years, rather than attempt to re-educate adolescents and adults. The objectives of this study were to design and evaluate:

1. A system of instruction for developing positive attitudes in children towards the environment.
2. A method for helping teachers to effectively teach the above system of instruction.

FIGURE 1. Conceptual Framework for Development of Environmental Attitudes and Knowledge.


POSITIVE ATTITUDES TOWARD ENVIRONMENTAL PROBLEMS
RESPONSIBILITY AND DECISION-MAKING ABILITY
EVALUATION OF ATTITUDES AND VALUES
ABILITY TO STATE INTERPRETATIONS BASED ON DATA
STATED AND CLARIFIED VALUES
SCIENTIFIC AND CRITICAL THINKING SKILLS DEVELOPED
DISCUSSED AND STATED VALUES
EXAMINATION OF EVIDENCE FOR DATA
GATHER EVIDENCE
SELECT PROBLEM
DEVELOP AWARENESS
STIMULATE INTEREST IN ENVIRONMENTAL PROBLEMS
VALUE CLARIFYING STRATEGIES
PROBLEM SOLVING APPROACH

The questions which were asked relative to the study were:

1. Do elementary school children show a different change in attitude with respect to the environment after participating in the Elementary Environmental Attitudes Program than those who do not participate?
2. After instruction, do the teachers show a different change in attitude with respect to environmental problems than those who do not receive treatment?
3. Is the amount of attitude change in the children related to the classroom in which the program is taught?
4. Do different environmental topics produce different amounts of attitude change in children?
5. Is the amount of attitude change related to the school the children attend?
6. Is the extent to which the teachers use the teaching strategies inherent in the system of instruction related to the amount of attitude change in the children.

Description of the Study

The study was conducted using twenty-nine student teachers from an elementary science methods class at the Faculty of Education, the University of Manitoba. Fifteen students were arbitrarily assigned as experimental group student teachers and fourteen students were likewise designated as control group student teachers. The experimental group participated in instructional sessions designed to assist them in implementing a specially prepared environmental education program --

Elementary Environmental Attitudes Program. In the classes of the student teachers of the experimental group, the elementary school children studied a unit in the Elementary Environmental Attitudes Program. The experimental groups of children were located in fifteen classrooms in four schools, whereas the control groups were located in fourteen classrooms in twelve schools. All the schools were located in the Greater Winnipeg area. The schools were located in areas of varying socio-economic level ranging from above average, to average, to below average socio-economic levels.

The study consisted of two interrelated parts-- the development and evaluation of an Elementary Environmental Attitudes Program to be used for the teaching of elementary school children in environmental science, and secondly, the development and evaluation of a system of instruction for the teaching of children in such a program.

The instructional model for use with the elementary school children consisted of using selected teaching strategies with selected environmental units. Those units which were judged suitable were from a group produced by a joint effort of the National Wildlife Federation and the Minnesota Environmental Sciences Foundation. The student teachers chose one of these booklets on which to base a teaching unit, incorporating problem solving and value clarifying strategies as described in a specially prepared teacher's guide.

The instructional model for teacher training consisted of a multi-media presentation of a series of colored slides about the environment which are correlated with an audio-tape of music and monologue. A

discussion period followed in which topics related to environmental problems were discussed. Subsequently the environmental units were chosen, and groups were formed of those student teachers with the same choices so that unit and lesson planning may begin. The instructor acted as an advisor and consultant when called upon. An instructional and lesson record booklet was provided for each student teacher. At a subsequent session, a game (Man in the Environment) was played to familiarize them with it before playing it with the children in the classes.

The research design of the study was divided into two separate but interrelated parts. The design to answer the questions related to the instructional model for teaching the children was separate from the design to answer the questions related to the instructional model for the training of the student teachers. However, the basic research design was of the same pattern, the non-equivalent control group design of Campbell and Stanley (1963) diagrammed below in Figure 2.

FIGURE 2. Design of the Evaluation

$$O_1 \times O_2$$

$$O_3 \quad O_4$$

Where X = treatment

O_1 and O_3 were the pretests for experimental and control groups consisting of:

Environmental Semantic Differential for both children and adults

Environmental Concern Inventory for the children

Questionnaire on Environmental Problems for the teachers.

O_2 and O_4 were the posttests for experimental and control groups consisting of:

Environmental Semantic Differential

Environmental Concern Inventory

Student Questionnaire

Questionnaire on Environmental Problems.

Evaluation

The instruments which were used in this study were employed for two main purposes -- to measure attitude change with respect to environmental problems and concerns, and to discover whether the teaching strategies inherent in the instructional model were indeed being used by the student teachers in the classroom.

The Environmental Semantic Differential was designed for this study to serve as a simple-to administer instrument which would indicate a measure of attitude toward the environment. Although a paper and pencil test, the semantic differential does have minimal reading and writing requirements. A test using color slides as criterion concepts and the semantic differential scoring methods was designed. Eight color slides were selected from hundreds of pictures of the environment were selected as being appropriate. Each slide was accompanied by the same twelve pairs of polar adjectives selected from Osgood's (1957) list of adjective pairs. Scores were expressed as factors of evaluation, potency, and activity. The test was administered as a pre and post test to both the student teachers and the children of the experimental group.

The Student Questionnaire designed for this study, consisted of fifteen items related to the use of value clarifying strategies in the classroom.

The children were asked to circle the best word in the brackets {often / sometimes / usually} which would complete the sentence as it applies to what the science classroom is like when the student teacher is teaching the environmental unit. The statements on the questionnaire were developed from a description of the desired value clarifying strategies and their effect on the science classroom as described in the instruction booklet for the Elementary Environmental Attitudes Program.

The Environmental Concern Inventory was developed by Kellner (1972) and was used with his permission in this study. Its purpose was to measure the change in attitudes and problem solving ability in children after they have experienced this environmental program. The test consists of twenty-three problem situations for which the child selects the best answer from several possibilities. This test was given as a pre and post test for the children in the experimental group.

The Questionnaire on Environmental Problems was developed by Stronck (1970) and students, and was used with his permission to try to determine the attitudes held by adults towards environmental problems. It consisted of seventeen statements about environmental concerns and issues to which the respondent was asked to use a Likert-type response.

Statistical Treatment

Analysis of the data was made by comparing the means of the pre and post test scores using the program ANOVAR (Veldman, 1967). A Pearson Product-Moment Correlation was used to determine the relationship between the teaching strategies exhibited and the attitude change of the children.

Results of the Study

Based on the data of this study, the following results were found with respect to the first question, "Do elementary school children show an

attitude change in ways different because of treatment?", it was found that, elementary school children did demonstrate a change in attitude toward the environment in six of the twenty-five test scores. The attitude change in all of these scores was in a negative direction, and the amount of change of some scores within the control group was actually larger than that of the experimental group. This may mean that the control group actually did better or that the new task of taking the pretest influenced the outcome for the control more than the treatment group. Possibly the instruments used did not measure the change which may have occurred or little change occurred due to insufficient time.

The second question, "Do student teachers change in the attitude towards environmental problems?", was answered in a similar fashion. The teachers changed in attitude on five out of twenty-five test scores--changes in three scores were negative and for two were in a positive direction. In this case, the change in the control group was larger than the experimental group for three scores. This could be another example of influence of pretest on the outcome of the control group or inaccurrate measurement by the instruments used or lack of time for change to occur in.

For the third question, "Is the attitude change related to the type of classroom in which the program is taught?", analysis of the data indicated that there were significant differences between the results from the classes of children taught by different student teachers. However, significant differences in the means of the pre-post change scores were found only for two test scores. This means that the classroom in which the program was taught was a critical factor in effecting attitude change, with significant

between-classroom difference. The limited pre-post change may be the result of instruments which due not adequately measure the true change, or else lack of time for change to occur in.

The fourth question was, "Do different environmental topics produce different amount of attitude change of the children studying the program?" Analysis of the data indicated that the topic was a significant factor in the performance of the children. For fourteen out of twenty-five test scores there were significant differences between the mean test scores. However, in examining the data for significant differences between pre-post scores, only two factors showed changes. This means that the topic was a critical factor in determining change but that significant measurable change rarely occurred. Time limitations would seem to have been a critical factor.

The fifth question, "Is the amount of attitude change in the children related to the school the children attended?" In Winnipeg, Manitoba, Canada, socio-economic level is usually reflected in the school population because the children neighborhood schools. Analysis of the date showed that for fifteen of the twenty-five scores there were significant differences between the mean scores of the children from different schools. However, there was very little pre-post test significant difference. This means that the school location was a critical factor in determining differences in attitude change but pre-post change was rarely significant because of time or instrument limitations.

The sixth question attempted to find out if there was a relationship between the extent to which the teachers exhibited the desired teaching

strategies (as perceived by the children) and the amount of attitude change of the children. Analysis of the data did not provide evidence that a relationship existed.

The conceptual framework on which this study was based defines teaching strategies as an integral part of the program of instruction. Based on the results of this study the effects of the differing classrooms, the effects of the different topics, or the school location of the children were more critical to the change in attitude than the actual teaching strategies used.

Conclusions

Certain scores of the Environmental Semantic Differential seem to provide more selectivity and discrimination with regards to attitude change. The activity factor of the meadow scene slide and the evaluative factor of the village scene slide were excellent detectors of attitude change with regard to student teachers, topics and schools (Table 1). When considering all the slides (Figure 3), slide 8, the village scene slide, has indicated the greatest change and the garbage scene, slide 6 the least (table 2). It should also be noted that slides 8, 5, 2 and 7 are meaningful discriminators as attitude indicators with both children and adults (Tables 2 and 3).

Because of the findings of this study a change in the conceptual framework on which the study is based in suggested - that of the factor of time. Time is probably a critical factor in effecting attitude change. Many of the student teachers wanted to have more time than the allotted six or seven lessons for the unit. They felt that twice this time would have been more reasonable.

TABLE 1. Direction of Attitude Change for Scores 15 and 22 as Related to Student Teachers, Topics and Schools

	Direction of Change	
	Score 15*	Score 22**
Topic 1 Man's Habitat-- The City	+	-
Topic 2 Sampling Button Populations	+	-
Topic 3 The Rise and Fall of a Yeast Community	+	+
Topic 4 Snow and Ice	-	-
Topic 5 Vacant Lot Studies	+	-
Topic 6 Shadows	+	-
School 1	-	+
School 2	+	-
School 3	+	-
School 4	-	-
Student Teacher 1	+	+
Student Teacher 2	+	-
Student Teacher 3	+	-
Student Teacher 4	+	+
Student Teacher 5	+	-
Student Teacher 6	+	-
Student Teacher 7	-	-
Student Teacher 8	+	+
Student Teacher 9	+	-
Student Teacher 10	+	+
Student Teacher 11	-	-
Student Teacher 12	-	+
Student Teacher 13	-	-
Student Teacher 14	+	-
Student Teacher 15	-	-

*the activity factor of the meadow scene.
**the evaluative factor of the village scene.

FIGURE 3. Description of Environmental Colored Slides Used in the Study and Predicted Attitude Change for Evaluative Factor

1. Two varieties of ducks feeding on the shore and at the edge of the water of a very clear, unpolluted lake. Attitude should become more positive.

2. A crowd of interracially mixed smiling children, fairly well dressed. Attitude should become less positive.

3. A demonstration crwod of teenagers and adults gathered round some cars and carrying a sign which says "Stop Muck". Attitude should become more negative.

4. Ducks feeding in the grass at the edge of a lake which has an accumulation of dirt and debris. Attitude should become more negative.

5. A meadow scene showing a close-up of some wild flowers and grasses. Attitude should become more positive.

6. A collection of overflowing garbage cans along a beick wall on which is painted "Please Put Trash in Cans". Attitude should become more negative.

7. A beach scene showing crowds of people both on the sand and in the water. Attitude should become more negative.

8. A village scene showing a very old broken down horse attached to a peddler's cart. The street is wet and dirty. Attitude should become more negative.

TABLE 2. Summary of discrimination between Colored Slides as Related to Attitude Change in Children (X indicates significant mean score)

Slide	Score	Between groups	Within trials	Groups X trials	Total
1	1	XXXX		X	5
	2	XXX			3
	3	X			1
2	4	XX	X		3
	5	XXX		X	4
	6	XX		XX	4
3	7	XX	X	X	4
	8	XXX			3
	9	XX		X	3
4	10	XXX			3
	11	XXX	X		4
	12			X	1
5	13	X	X	XX	4
	14	XXX			3
	15	XX	XXX	XXX	8
6	16	X			1
	17	XXX			3
	18	XX			2
7	19	XXX	X	XX	6
	20	XXX		X	3
	21	X			2
8	22	XXXX	XXXX	XXX	11
	23	XXX			3
	24	XXX		XXX	6

TABLE 3. Summary of Discrimination between Colored Slides as Related to Attitude Change in Student Teachers (X indicates significant mean scores)

Slide	Score	Between groups	Within trials	Groups X trials	Total
1	1				
	2				
	3				
2	4	X	X		2
	5				
	6	X	X		2
3	7				
	8				
	9				
4	10			X	1
	11				
	12				
5	13				
	14	X	X		2
	15				
6	16				
	17				
	18				
7	19				
	20				
	21	X	X		2
8	22	X	X		2
	23				
	24				

This research study has again confirmed one well-known element in learning - the classroom teacher is a most critical factor accounting for many of the differences in the learning and attitude change of the children, and suggests that the topic studied and the school attended are of some importance also.

The use of color slides as criteria for recognizing attitude change is a new area of research and this limited study indicates the possible potential for this medium. More research is needed for the identification of appropriate slides for specific situations.

Aside from the study itself this environmental program was successful as a curriculum component in the schools where it operated. It was well received--filling a gap in the curriculum--and motivating student and cooperating teachers alike to introduce many new aspects of environmental science into the classrooms. Anecdotal and audio-taped evidence strongly supports this claim.

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